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An analysis of the causes of mortality and co-morbidities in hospitalised patients with chronic obstructive pulmonary disease

Analiza przyczyn zgonów i chorób współistniejących u hospitalizowanych chorych na przewlekłą obturacyjną chorobę płuc

Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death in the United States. Patients with COPD often suffer from various co-morbidities, such as cardiovascular disease, osteoporosis, cachexia and anaemia, which are a consequence of systemic inflammation. The co-morbidities of COPD are believed to be associated with a more severe course of the underlying disease and with a poorer prognosis. It is being disputed whether extrapulmonary co-morbidities or respiratory complications are the main cause of mortality in patients with COPD. The aim of the study was to analyse the causes of death and co-morbidities in COPD patients who had died during hospitalisation at the Department of Internal Medicine, Pneumonology and Allergy, Medical University of Warsaw, Poland, between 2004 and 2008.

Material and methods: We analysed 266 consecutive medical records of COPD patients who had died during hospitalisation. They included 179 men (67%) and 87 women (33%). The mean age at death was 73 ± 8 years (women: 74 ± 9 years).

Results: The causes of death in the analysed group of patients included: acute exacerbation of COPD (n = 81 [81%]; 49 men and 32 women), pneumonia (n = 67 [25%]; 50 men and 17 women), lung cancer (n = 50 [19%]; 32 men and 18 women), ischaemic heart disease (n = 20 [7%]; 15 men and 5 women), heart failure (n = 14 [5%]; 8 men and 6 women) and other causes (n = 34 [14%]). Most of the deaths from lung cancer were observed among younger patients (p = 0.002), while most of the deaths from pneumonia among older patients (p = 0.02). The most common co-morbidities in the study population included: chronic heart failure (n = 169), hypertension (n = 103), ischaemic heart disease (n = 102), type 2 diabetes mellitus (n = 55), renal failure (n = 43), benign prostatic hyperplasia (n = 36), lower limb atherosclerosis (n = 28), osteoporosis (n = 19) and anaemia (n = 14).

Conclusions: Respiratory tract pathologies, such as acute exacerbation of COPD, pneumonia and lung cancer, were the most common causes of death in the study population, while cardiovascular disease and type 2 diabetes mellitus were the most common co-morbidities seen in these patients.

Key words: COPD, cause of death in hospitalised patients, co-morbidities

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Introduction

Chronic obstructive pulmonary disease (COPD) is a condition characterised by a progressive and poorly reversible limitation of airflow in the respiratory tract caused by an excessive inflammatory response of the respiratory system to noxious dusts or gases (particularly to tobacco smoke). It has recently been proposed to view COPD as a systemic inflammatory disorder, as the respiratory changes are accompanied by significant extrapulmonary ones, such as cachexia, osteopo-

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Table 1. The main cause of death COPD patients

Cause of death	n (%)	Sex (F, M)	Age at the death (years)
COPD exacerbation	81 (30%)	F = 32 M = 49	73 ± 8
Pneumonia	67 (25%)	F = 17 M = 50	76 ± 8*
Lung cancer	50 (19%)	F = 18 M = 32	69 ± 9**
Ischaemic heart disease	20 (7%)	F = 5 M = 15	74 ± 6
Heart failure	14 (5%)	F = 6 M = 8	73 ± 9

*p = 0,02; **p = 0,002

rosis, loss of lean body mass, depression, anaemia and a higher prevalence of cardiovascular disease. The definitions of COPD contained in the Global Initiative for Obstructive Lung Disease (GOLD) report and the guidelines of the European Respiratory Society (ERS) and the American Thoracic Society (ATS) also emphasise the fact that COPD is a preventable and treatable disease [1, 2]. In spite of that, however, COPD is currently a leading cause of mortality worldwide. The data from the Global Burden of Disease Study contained in the GOLD report indicate that COPD will have become the third most common cause of death by 2020 compared to 1990, when the disease ranked sixth in terms of the most common causes of mortality [1]. According to the World Health Organisation (WHO) report published in 2007, COPD was the fifth most common cause of death worldwide. This increase is associated with the increasing prevalence of smoking and population ageing. Cardiovascular disease, pneumonia and cancer are considered common causes of death in patients with COPD [3, 4].

The aim of the study was to analyse the causes of death and co-morbidities in COPD patients who had died during hospitalisation at the Department of Internal Medicine, Pneumonology and Allergy, Medical University of Warsaw, Poland, between 2004 and 2008.

Material and methods

This was a retrospective study in which we analysed 854 medical records of patients who had died at the Department of Internal Medicine, Pneumonology and Allergy, Medical University of Warsaw, Poland, between 2004 and 2008. In 266 cases (179 [67%] men and 87 [33%] women), one of the diagnoses was COPD (ICD-10 code: J44). The mean age at death among the patients with COPD was 73 ± 8 years 73 ± 8 years (men: 73 ± 8 years; women: 74 ± 9 years). The cause of death was established on the basis of the diagnosis made by the treating physician, and the co-morbidities were established on the basis of history, discharge reports from previous hospitalisations and the investigations performed during the hospitalisation.

Results

In most of the patients from the study population, the causes of death may be subdivided into respiratory and cardiovascular causes. Table 1 summarises the main causes of death in the study population by age and sex. The mean age at death in patients who had died from lung cancer was significantly lower from the mean age of the study population (p = 0.002), while pneumonia was the main cause of death in most of the older patients (p = 0.02). In isolated cases the causes of death were as follows: pulmonary embolism (n = 5), stomach cancer (n = 2), oesophageal cancer (n = 2), renal cancer (n = 2), cancer of unknown primary (n = 2), renal failure (n = 3), acute respiratory failure (n = 3), staphylococcal sepsis (n = 2), pulmonary haemorrhage (n = 1), pneumothorax (n = 1), pneumomediastinum (n = 1), pulmonary tuberculosis (n = 1), pleural empyema (n = 1), intestinal obstruction (n = 1), gastrointestinal haemorrhage (n = 2), stroke (n = 1), pulmonary fibrosis (n = 1), chronic lymphocytic leukaemia (n = 1), lymphoma (n = 1) and aspiration (n = 1). The most common co-morbidities in the study population were cardiovascular diseases: chronic heart failure, hypertension and ischaemic heart disease. Table 2 summarises the prevalence of the most common co-morbidities in the study population. The following co-morbidities were less common: hyperthyroidism (n = 8), cholelithiasis (n = 8), rheumatoid arthritis (n = 2) and isolated cases of a history of cancer in various sites. Nine subjects had a history of stroke. The causes of death in patients receiving home oxygen therapy were analysed separately. The mean age at death among these patients was 73 ± 7 years. The causes of death included an acute exacerbation of COPD in 17 cases,

Table 2. Comorbidities in COPD patients

Disease	n	K/F	M/M
Chronic heart failure	169	51	118
Arterial hypertension	103	37	66
Ischaemic heart disease	102	37	65
Respiratory failure	82	28	54
Diabetes mellitus type 2	55	15	40
Lung tuberculosis in anamnesi	45	12	33
Chronic renal failure	43	10	33
Hypertrophy prostatae	36	–	36
Osteoporosis	19	10	9
Anaemia	14	2	12

pneumonia in 4 cases, lung cancer in 2 cases and pulmonary embolism in 1 case.

Discussion

Chronic obstructive pulmonary disease is an inflammatory disorder. The long-reported inflammation is not, however, local and confined to the airways: it is a systemic inflammation whose mediators are also responsible for the extrapulmonary consequences of COPD. The commonly used prognostic markers are FEV_1 (forced expiratory volume in one second) and the BODE index, which takes into account body mass index (BMI), airway obstruction (as measured by FEV_1), dyspnoea (as measured by the MRC [Medical Research Council] dyspnoea scale) and exercise tolerance (as measured by the 6-minute walk test distance) [5].

Recent studies suggest that lung cancer, muscular atrophy, osteoporosis, anaemia, ischaemic heart disease, anxiety and depression often co-exist with COPD [6]. The causes of death in patients with COPD reported in the literature depend on the characteristics of the study population. In the Lung Health Study, over the 14 years of follow-up of 5887 smokers aged 35–60 years with the diagnosis of mild to moderate airway obstruction on spirometry, the most common causes of death included cancer (33%) and cardiovascular disease (22%) with respiratory diseases accounting for a mere 8% [7]. The analysis of causes of death in a group of patients with severe COPD managed with inhaled glucocorticosteroids shows different results: the most common causes of death were respiratory diseases (34%) and cardiovascular disease (30%) with cancer occurring in 21% of the cases (most of which were respiratory tract malignancies). In this analysis the patients who had died from respiratory causes had considerably lower FEV_1 values compared to the others [8]. Similar results were obtained in the TORCH (Towards the Revolution in COPD Health) study, in which respiratory diseases accounted for 35%, cardiovascular disease for 27% and cancer for 21% of deaths [9]. A larger number of deaths due to respiratory causes in the group managed with inhaled glucocorticosteroids may be associated with a higher number of pneumonia cases [10].

In a two-year prospective analysis conducted by Scandinavian researchers, in a group of 416 patients hospitalised for an acute exacerbation of COPD, the main causes of death were respiratory complications, cardiovascular complications and cancer. Patients who had died were characterised by an older age, worse spirometric parameters and worse general health. The prognosis was additionally worsened by diabetes mellitus [11]. Our results are consistent with those reported in the literature. Respiratory and cardiovascular diseases were the most common causes of death in our patients. However, the lack of complete data made it impossible to carry out an analysis based on the severity of the disease established on the basis of FEV_1. Most of our patients were being managed with systemic glucocorticosteroids during hospitalisation. The mean age at death was 73 ± 8 years and was significantly lower in the group of patients who had died from lung cancer (69 ± 9 years). Other respiratory diseases, mainly pneumonia, as the causes of death in COPD patients are often discussed. In a paper on the role of infection as the cause of death in COPD, Sethi [12] points out to the role of chronic bacterial infection, which — if unsuccessfully treated with antibiotics — contributes to the constant decrease in respiratory reserves and forms a portal of entry for other microorganisms. In their analysis of the causes of death in patients with chronic respiratory failure on home oxygen therapy, Zieliński et al. [13] listed the following as the main causes of death: acute respiratory failure (38%), heart failure (13%), respiratory infections (11%), pulmonary embolism (10%), cardiac arrhythmias (8%), lung cancer (7%). In our study population, a total of 24 subjects had been on home oxygen therapy and the direct causes of death were similar: an acute exacerbation of COPD in 17 cases, pneumonia in 4 cases, lung cancer in 2 cases and pulmonary embolism in 1 case.

Co-morbidities are a significant factor affecting the general condition of COPD patients. As already mentioned, diabetes mellitus is an important factor affecting mortality in patients with COPD. The three main co-morbidities of COPD in

our study were: chronic heart failure, hypertension and ischaemic heart disease. These were followed by: type 2 diabetes mellitus, peripheral artery disease, osteoporosis and anaemia. These findings are consistent with the literature [3].

Conclusions

Respiratory tract pathologies, such as acute exacerbation of COPD, pneumonia and lung cancer, were the most common causes of death in the study population, while cardiovascular disease and type 2 diabetes mellitus were the most common comorbidities seen in these patients.

Refrences

1. Światowa strategia rozpoznawania, leczenia i prewencji przewlekłej obturacyjnej choroby płuc. Aktualizacja 2008. Medycyna Praktyczna, wydanie specjalne 2009; 6.
2. ATS/ERS Task Force Report: Standards for the diagnosis and treatment of patients with COPD: a summary of the ATS/ERS position paper. Eur. Respir. J. 2004; 23: 932–946.
3. Sin D.D., Anthonisen N.R., Soriano J.B., Agusti A.G. Mortality in COPD: role of comorbidities. Eur. Respir. J. 2006; 28: 1245––1257.
4. Celli B.R. Predictors of mortality in COPD. Respir. Med. 2010; 104: 773–779.
5. Celli B.R., Cote C.G., Marin J.M. et al. The body-mass index, airflow obstruction, dyspnea, and exercise capacity index in chronic obstructive pulmonary disease. N. Engl. J. Med. 2004; 350: 1005–1012.
6. Barnes P.J., Celli S.F. Systemic manifestations and comorbidities of COPD. Eur. Respir. J. 2009; 33: 1165–1185.
7. Anthonisen N.R., Skeans M.A., Wise R.A., Manfreda J., Kanner R.E., Connett J.E. The effects of smoking cessation intervention on 14.5 year mortality: a randomized clinical trial. Ann. Intern. Med. 2005; 142: 233–239.
8. Sin D., Wu L., Anderson J. et al. Inhaled corticosteroids and mortality in chronic obstructive pulmonary disease. Thorax 2005; 60: 992–997.
9. Calverley P.M., Anderson J.A., Celli B. et al. Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. N. Engl. J. Med. 2007; 356: 775–789.
10. Crim C., Calverley P.M., Anderson J.A. et al. Pneumonia risk in COPD patients receiving inhaled corticosteroids alone or in combination: TORCH study results. Eur. Respir. J. 2009; 34: 641–647.
11. Gudmundsson G., Gislason T., Lindberg E. et al. Mortality in COPD patients discharged from hospital: the role of treatment and co-morbidity. Respir. Res. 2006; 7: 109–117.
12. Sethi S. Infection as a comorbidity of COPD. Eur. Respir. J. 2010; 35: 1209–1215.
13. Zielinski J., MacNee W., Wedzicha J. et al. Causes of death in patients with COPD and chronic respiratory failure. Monaldi Arch. Chest Dis. 1997; 52: 43–47.